EOSPEC-LIB:
a model library complementary to MODTRAN5.3
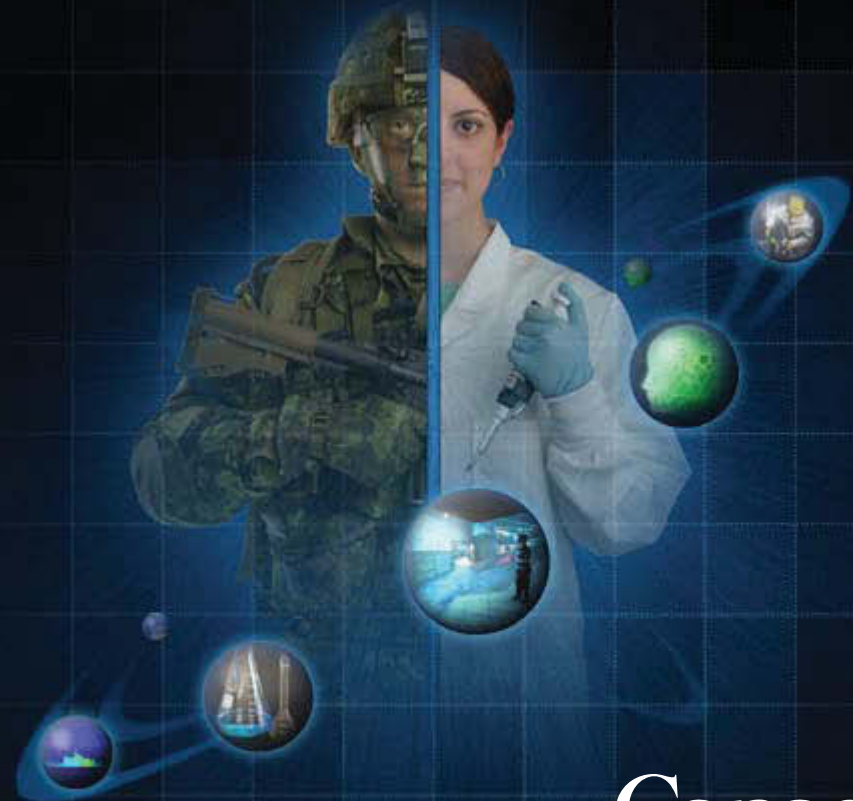
Denis Dion, Vincent Ross* and Martin Soucy**

* with AEREX Avionic Inc

** with Lti inc

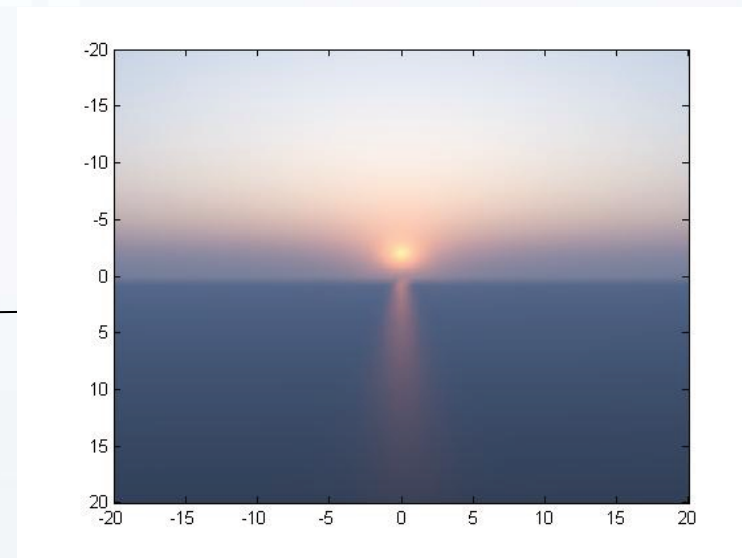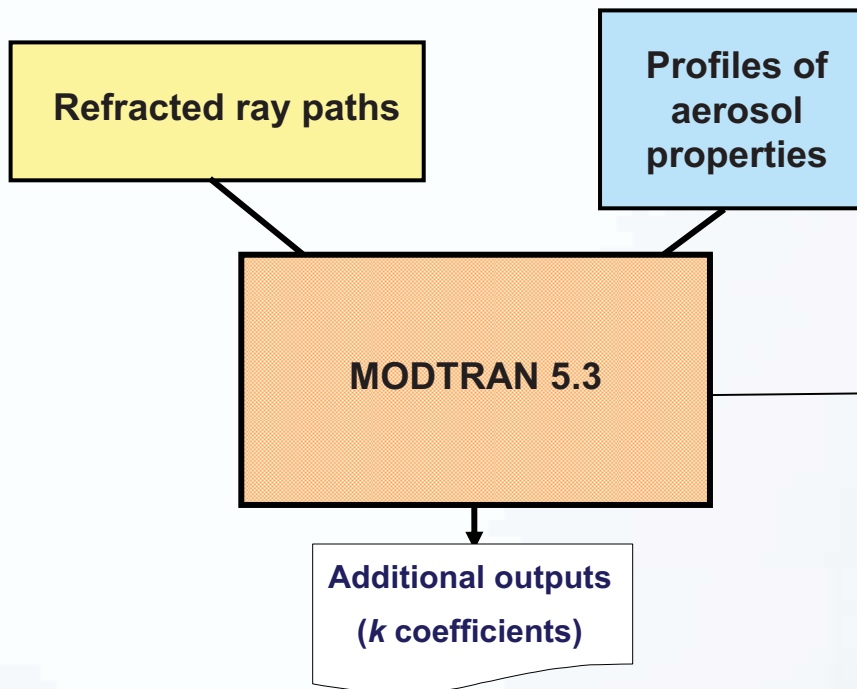**33rd Review of Atmospheric Transmission Models Meeting**

June 2011

Canada

Report Documentation Page

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Outline

- ➢ MODTRAN 5.3 new capability

- ➢ EOSPEC-LIB: purpose & structure

- ➢ Modules description

- ➢ Demo

MODTRAN 5.1 → MODTRAN 5.3

Refracted ray paths

Profiles of aerosol properties
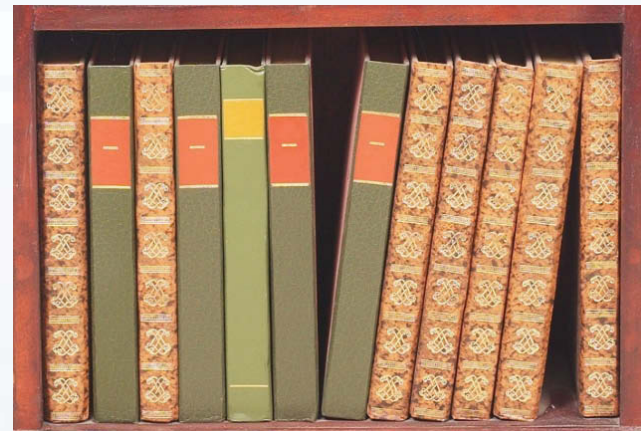
MODTRAN 5.3

Additional outputs (*k* coefficients)

EOSPEC Library of functions

Environmental characterization

- **Surface Layer Micro-Meteorology**

- **Thermodynamic Profiles**

- **Refractivity Profiles**

- **Aerosol Profiles**

- C_n^2 **Profiles**

Propagation

- **Ray-tracing / refraction effects**

- **MODTRAN Driver**

- **Wideband-CK RT library: SMART(I)**

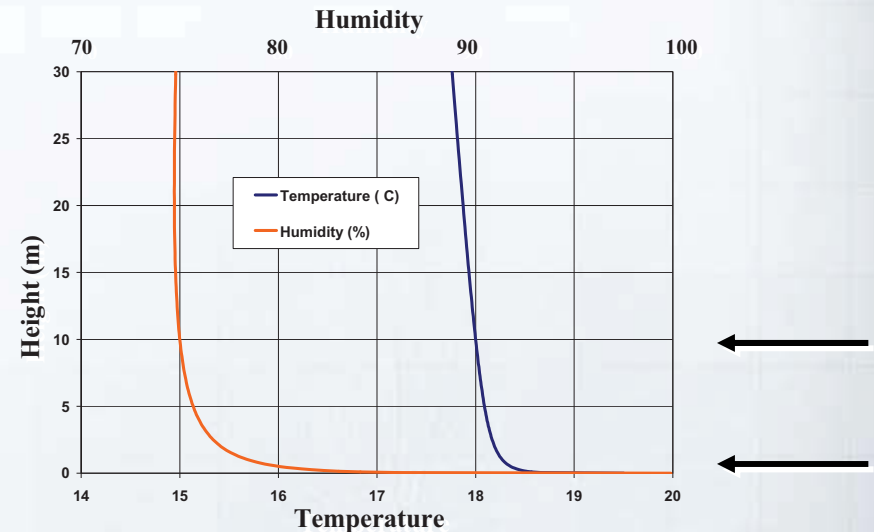- **Turbulence effects (statistical quantities)**

EOSPEC Library of functions

DEFENCE R&D DÉFENSE

```
EOSPECS_Nov2010
    .svn
    bin
    build
    data
    demos
    doc
    examples
        .svn
        module
        utilities
    external
    include
    lib
    src
    tmp
    VandV
```

Features

- **C++ Library**

- **Presented as *.h* files, *.dll* and driver program examples**

- **Obeys standards of development and programming**

- **Technical documentation and user-guides**

- **High-language portability (Java, python, …)**

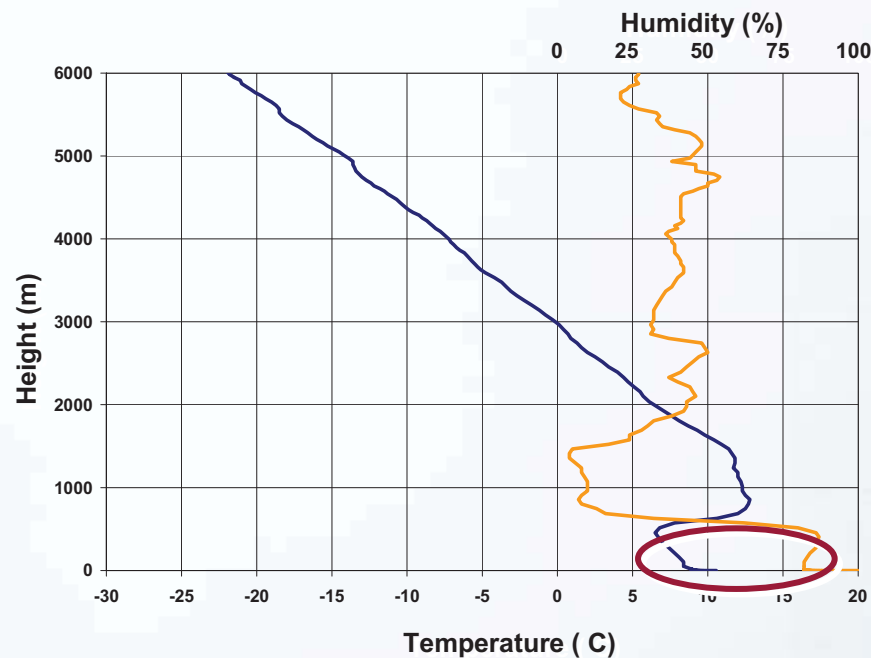# Atmospheric profiles

1- Surface layer modeling

❖ Monin-Obukhov similarity theory

❖ Marine and land

❖ Valid up to 30 m roughly

Atmospheric profiles
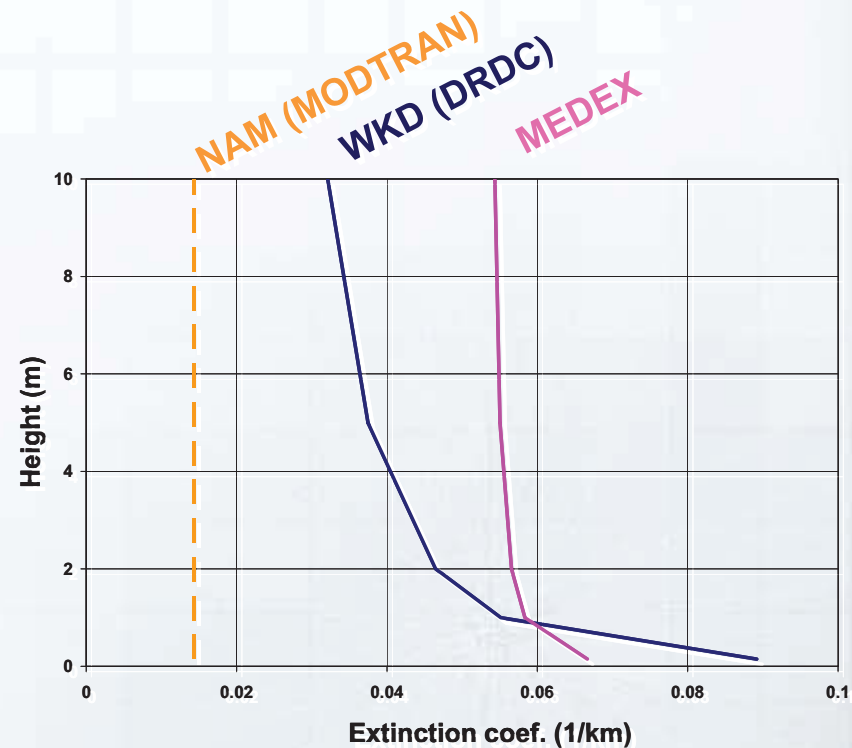
2- Surface + upper-layer modeling

- ❖ MODTRAN standard profiles
- ❖ Radio-sonde profiles (incl. TEMP)
- ❖ Modeled profiles (GEM)

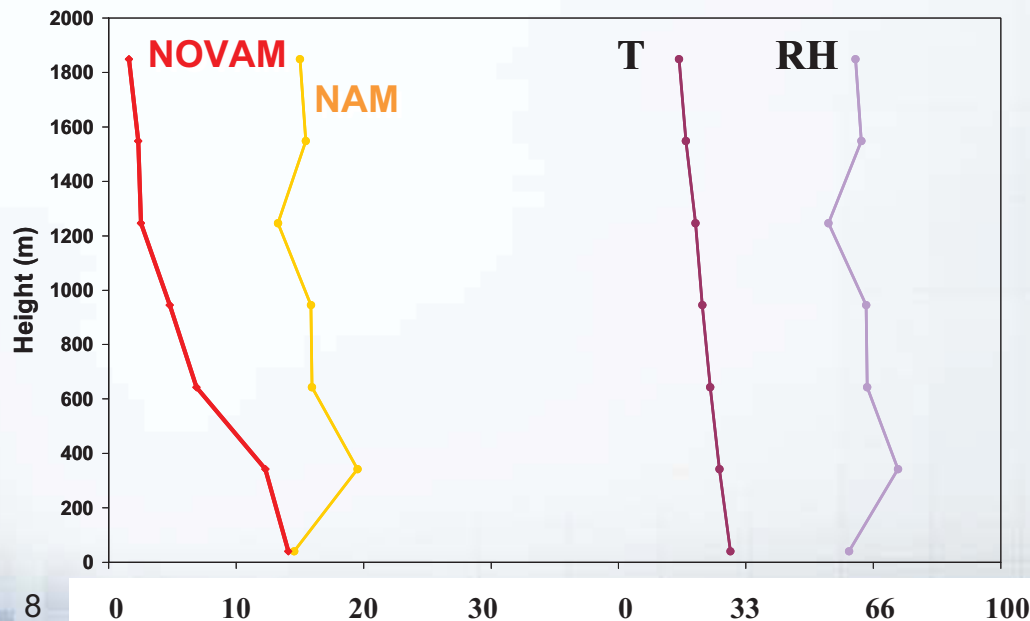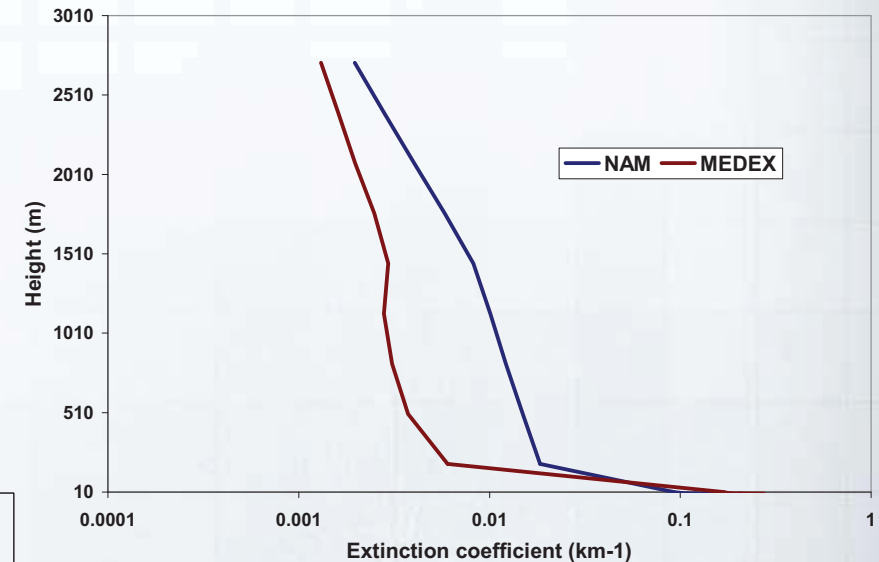# Aerosol profiles (maritime)

1- Surface layer modeling

❖ Surface to 10 m

❖ Selection of models:

- NAM
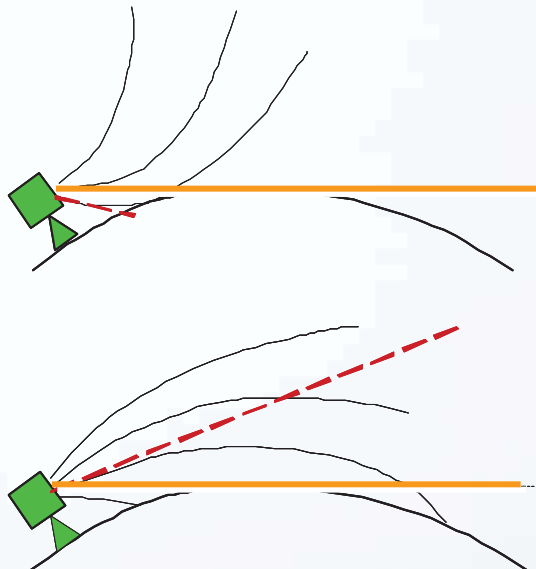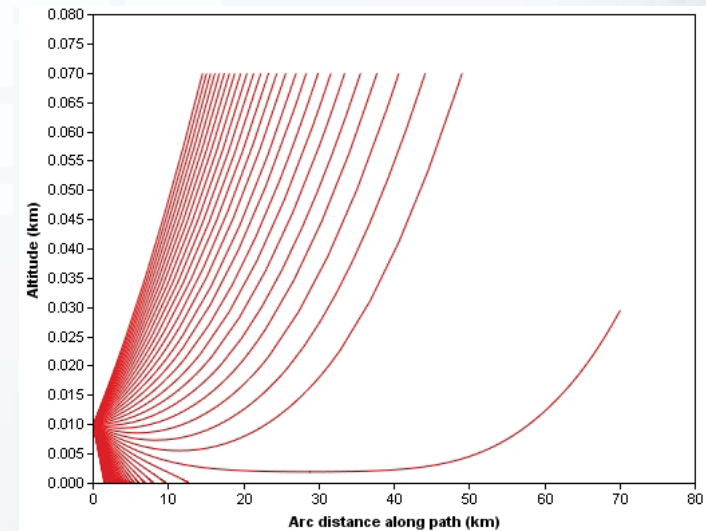- WKD (DRDC)
- MEDEX
- …

Aerosol profiles (maritime)

2- Surface + upper-layer modeling

❖ In-depth revision of NOVAM

❖ Provide Phase functions

❖ Coupled with surface aerosol model

Refracted raypaths

- ❖ Fast ray-tracing
- ❖ To account for sub- and super-refraction
- ❖ Provide the elevation-viewing angle distortion function (refraction gain or *refractance*)

Neutral condition   **Unstable condition**

DEMO …

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